11. Concerns about seismic activity related to injection activity.%%%

Letter ID	Commenter Name	Commenter Org.	Text
00200	Ex. 6 Personal Privacy (PP) 11.0 11.1	Individual	Subject: Dewey Burdock Comment To Shea Valois, I am writing to express my concern over the permits and aquifer exemption decision requested by PowerTech for the Dewey Burdock ISR site. In an area such as the southern Black Hills, ~~with so little drinking water resources, I feel that granting an aquifer exemption would be a very poor choice on the EPA's part, and not in the best interest of the area's current & future citizens.~~ Moved to p. 469 Along with the inherent drinking water risks, the increased risk of earthquakes associated with deep injection wells must also be considered. Deep injection sites in Oklahoma have exponentially increased the occurrence of earthquakes in that state. It is the responsibility of the EPA to take into consideration lessons learned from previous situations that have endangered human safety and apply them to current decisions that are being made. It is for these reasons that I strongly feel that the EPA should deny the aquifer exemption request along with the two UIC permits. Thank you for the opportunity to express my opinion on this matter.
00231	Ex. 6 Personal Privacy (PP) 11.3 11.4	Individual	Subject: Uanium etraction project in western South Dakota. Dear Environmental Protection Agency, At the recent hearing held in Rapid City I referenced a study conducted by the U.S. Geological Service. This study was in reference to a series of earthquakes instituted by the injection of nuclear and hazardous wastes mixed with water into bore holes in the area of the Rocky Mountain Arsenal in Colorado. These incidents were in the 1960's. Although these were deep bore holes, this unfortunate process illustrates that, in spite of any geological knowledge we have attained, we still do not have an understanding of the far-reaching effects of any possible damage we can do to the structure of the Earth
00261	Ex. 6 Personal Privacy (PP) 11.5	Individual	Subject: comments on Dewey-Burdock permit application Comments on Dewey-Burdock ISM Disposal Well Permit Application The permit application fails to address the reasonably foreseeable event of a natural or induced earthquake along the Dewey fault, which lies only a mile from the project area. The geologic study prepared for the permit application does not employ best current science. To be specific: 1. The study does not classify the Dewey fault as a capable fault. As nearly as I can determine, the Dewey fault meets at two of the four criteria for a capable fault, only one of which is needed

Letter ID	Commenter Name	Commenter Org.	Text
			for a fault to be classified as capable. It may meet all four criteria; however, this is difficult to determine because local seismic data are not available to me. (Definition of capable fault can be found here: https://www.nrc.gov/reading-rm/doc-collections/cfr/part100/part100-appa.html Earthquakes of greater than 3.0 magnitude have occurred in the immediate area on July 17, 1920, December 30, 1924, and May 3, 1996. A 3.5 magnitude earthquake east of the town of Custer that occurred on December 12, 2013, may have been associated with the Dewey fault. Please explain how it was determined that the Dewey fault is not capable. 2. The permit application assumes that movement along the Dewey fault, which is already estimated as having experienced a 440-foot vertical displacement, cannot disrupt "confining" shale strata that are only 20 to 80 feet thick. This assumption is clearly wrong. Nowhere does the permit application address this scenario. 2 Source: https://www.nps.gov/parkhistory/online_books/geology/publications/bul/1063-G/sec2.htm What is the basis for the assumption that the movement of the Dewey fault will not cause displacement of the so-called confining strata and mixing of aquifers? 3. The application does not address the possibility of induced earthquakes from the waste-disposal wells needed in the proposed uranium extraction process, nor does it address the likelihood of eventual hydraulic fracturing to extract oil and gas in western Fall River County. According to USGS studies, deep wells used to dispose of wastewater from fracking can cause earthquakes as far as 10 miles from the location of an injection well: "Earthquakes can be induced at distances of 10 miles or more away from the injection point and at significantly greater depths than the injection point." Note that the Dewey Fault is only two miles from the proposed well sites. (USGS website, accessed 5/22/2017.) http://rapidcityjournal.com/news/local/seismic-crews-want-to-test-up-to-acres-northwestof/article_2d670e86-f90b-5db4-8bd6-19075034e04e.html What is the reason for assuming that neither natural nor induced earthquakes can happen in or near the project area and create disruption of confining strata and mixing of underground water bodies? 4. Further, the USGS studies demonstrate that injection wells can cause such earthquakes even without the presence of high-pressure injection. "In operations where engineers pour fluid down the well without added pressure at the wellhead still increase the fluid pressure within the formation and thus can induce earthquakes." (USGS website, accessed 5/22/2017.) Please explain why it is assumed here that the proposed wells cannot induce earthquakes, given the presence of relatively soft rock strata and geologic faults within and adjacent to the project area. 5. The USGS has developed methods to estimate the risk of such wells causing earthquakes. These methods have not been applied here. (USGS website, accessed 5/22/2017.) 3 Please clarify

Letter ID	Commenter Name	Commenter Org.	Text
			whether earthquake risk evaluation methods have been applied here and state the results of such evaluations. [...] 7. I also notice that the permit application makes no mention of a fault lying within the project area, which is described in Stratigraphic and Structural Controls of Uranium Deposits on Long Mountain, South Dakota, by William A. Braddock, US Geological Survey Bulletin 1063-A, 1957, page 51. Why was the presence of this fault omitted from the application?
00262	Ex. 6 Personal Privacy (PP) 11.0 11.1	Individual	Injection-Induced Earthquakes A July 2013 study by US Geological Survey scientist William Ellsworth links earthquakes to wastewater injection sites. In the four years from 2010-2013 the number of earthquakes of magnitude 3.0 or greater in the central and eastern United States increased dramatically. After decades of a steady earthquake rate (average of 21 events/year), activity increased starting in 2001 and peaked at 188 earthquakes in 2011. USGS scientists have found that at some locations the increase in seismicity coincides with the injection of wastewater in deep disposal wells. Injection-induced earthquakes are thought to be caused by pressure changes due to excess fluid injected deep below the surface and are being dubbed "man-made" earthquakes. http://people.uwec.edu/piercech/HazwasteWebsSp04/ DeepWellInjection/DeepWellInjection.htm Linsey McLean cell: (605) 484-5314 mclean.linsey@gmail.com 6 References: High-rate injection is associated with the increase in U.S. mid-continent seismicity Barbara A. Bekins, and Justin L. Rubinstein Abstract An unprecedented increase in earthquakes in the U.S. mid-continent began ... in 2009. Many of these earthquakes have been documented as induced by wastewater injection. We examine the relationship between wastewater injection ... and U.S. mid-continent seismicity using a newly assembled injection well database for the central and eastern United States. We find that the entire ... increase in earthquake rate is associated with fluid injection wells. High-rate injection wells (>300,000 barrels per month) are much more likely to be ... Induced Earthquakes The primary cause of the recent increase in earthquakes in the central United States. Wastewater disposal wells typically operate for longer durations and ... injection wells induce earthquakes. Most injection wells are not associated with felt earthquakes. A combination of many factors is necessary for injection to ... induce felt earthquakes. These include: the injection rate and total volume injected; the presence of faults that are large enough to produce felt ... earthquakes; stresses that are large enough to produce earthquakes; and the presence of pathways for the fluid pressure to travel from the injection ... Injection-induced earthquakes Abstract Earthquakes in unusual locations have become an important topic of discussion in both North America and Europe, owing to the concern that ... and underground mining, withdrawal of fluids and gas from

Letter ID	Commenter Name	Commenter Org.	Text
			the subsurface, and injection of fluids into underground formations. Injection-induced ... production of oil and gas from previously unproductive formations. Earthquakes can be induced as part of the process to stimulate the production from tight ... associated with industrial activity, with a focus on the disposal of wastewater by injection in deep wells; assess the scientific understanding of induced ... A Century of Induced Earthquakes in Oklahoma? related to oil production, particularly disposal of wastewater in deep injection wells, are known to potentially cause earthquakes. Prior to the ... Release Date: October 26, 2015The rate of earthquakes has increased sharply since 2009 in the central and eastern United States, with growing ... evidence confirming that these earthquakes are primarily caused by human activity, namely the injection of wastewater in deep disposal wells. The rate of ... earthquakes has increased sharply since 2009 in the central and eastern United States, with growing evidence confirming that these earthquakes are ... Linsey McLean cell: (605) 484-5314 mclean.linsey@gmail.com 7 Sharp increase in central Oklahoma seismicity 2009-2014 induced by massive wastewater injection data required to unequivocally link earthquakes to injection are rarely accessible. Here we use seismicity and hydro-geological models to show that ... earthquakes to distances of 35 km, with a triggering threshold of ~0.07 MPa. Although thousands of disposal wells may operate aseismically, four of ... Sharp increase in central Oklahoma seismicity 2009-2014 induced by massive wastewater injection Science By: Kathleen, M. Keranen, Geoffrey A. Abers ... , Matthew Weingarten, Barbara A. Bekins, and Shemin Ge
00277	Ex. 6 Personal Privacy (PP)	Individual	In addition, research has linked deep injection wells to local earthquakes. These earthquakes have the potential to cause damage to the wells and may also cause structural damage that will impact local populations. Sincerely, Lori Nidoh
00306, 00307		Individual	The simple fact of the matter is that big oil and fracking have been running amok and the result of that is an increase of seismic activity from coast to coast which has been scientifically proven! The other fact of the matter is that there is a volcano, a supervolcano in fact, laying dormant under the entire Midwest that is long overdue for an eruption and if the fracturing of the Earth's mantle - let alone mining for Uranium - is allowed to continue, the seismic activity stands to increase and intensify to the point of triggering said eruption!
00312		Individual	Subject: Uranium aquifer exemption public comment I do not support these draft permits. In one regard, the energy sector has apparently learned nothing from the geological destabilization that has occurred in Oklahoma and other locations that have allowed injection wells as part of fracking activities. Additionally, there are no studies or details indicating what has actually BEEN placed into injection wells. However, we do know

Letter ID	Commenter Name	Commenter Org.	Text
			that earthquakes have occurred and toxic materials have appeared in the water sources after these injection wells have been allowed.
00335	Ex. 6 Personal Privacy (PP)	Individual	There are always the potential for human error, unexpected seismic events...
00352		Individual	Considering what injection well technology has done to the relatively stable geology of Oklahoma and other states, I would think that special consideration would be given to an area that has already shown earthquake activity and that is so directly linked to water supplies throughout the southern Black Hills.
00349		Individual	. The presence of a fault, shows the potential of consistent seismic activity within the permit zones and additional potential of groundwater flow being directed towards the fault line.
00415		Individual	Subject: Powertech/Azarga Dewey Burdock proposal public commentary I am against the Dewey Burdock proposal for injection wells and hazardous waste disposal. First of all it is too close to Yellowstone caldera. We do have earthquakes in this area with one being a year or two ago in Ardmore.
00423		Individual	In addition, research has linked deep injection wells to local earthquakes. These earthquakes have the potential to cause damage to the wells and may also cause structural damage that will impact local populations. Theresa Black
00445		Individual	**Injection Wells Don't Just Pollute** ***1.)*** They are well known to cause earthquakes, as hazardous wastes are continuously being pumped into the aquifers at high pressure, and the wastes are meant to stay in the ground forever. The pressure that the wastes exert in the aquifer forces the wastes to move vertically and horizontally in all directions, mixing with the local waters there and traveling with the flow underground. The pressure also causes more fractures and fissures in the rock layers, causing earthquakes, and further mixing of the wastes into the aquifers. Fracking is a similar principle. Oklahoma has been the site of numerous fracking areas and have increased a record number of earthquakes and contaminated drinking water wells, and the earthquakes continue even after two years of a tracking ban.

Letter ID	Commenter Name	Commenter Org.	Text
			INJECTION-INDUCED EARTHQUAKES A July 2013 study by US Geological Survey scientist William Ellsworth links earthquakes to wastewater injection sites. In the four years from 2010-2013 the number of earthquakes of magnitude 3.0 or greater in the central and eastern United States increased dramatically. After decades of a steady earthquake rate (average of 21 events/year), activity increased starting in 2001 and peaked at 188 earthquakes in 2011. USGS scientists have found that at some locations the increase in seismicity coincides with the injection of wastewater in deep disposal wells. Injection-induced earthquakes are thought to be caused by pressure changes due to excess fluid injected deep below the surface and are being dubbed "man-made" earthquakes.
00445	Ex. 6 Personal Privacy (PP)	Individual	**References:** High-rate injection is associated with the increase in U.S. mid-continent seismicity (https://pubs.er.usgs.gov/publication/70161978) Barbara A. Bekins, and Justin L. Rubinstein Abstract An unprecedented increase in earthquakes in the U.S. mid-continent began ... in 2009. Many of these earthquakes have been documented as induced by wastewater injection. We examine the relationship between wastewater injection ... and U.S. mid-continent seismicity using a newly assembled injection well database for the central and eastern United States. We find that the entire ... increase in earthquake rate is associated with fluid injection wells. High-rate injection wells (>300,000 barrels per month) are much more likely to be ... Induced Earthquakes (https://earthquake.usgs.gov/research/induced/myths.php) The primary cause of the recent increase in earthquakes in the central United States. Wastewater disposal wells typically operate for longer durations and ... injection wells induce earthquakes. Most injection wells are not associated with felt earthquakes. A combination of many factors is necessary for injection to ... induce felt earthquakes. These include: the injection rate and total volume injected; the presence of faults that are large enough to produce felt ... earthquakes; stresses that are large enough to produce earthquakes; and the presence of pathways for the fluid pressure to travel from the injection ... Injection-induced earthquakes (https://pubs.er.usgs.gov/publication/70048668) Abstract Earthquakes in unusual locations have become an important topic of discussion in both North America and Europe, owing to the concern that ... and underground mining, withdrawal of fluids and gas from the subsurface, and injection of fluids into underground formations. Injection-induced ... production of oil and gas from previously unproductive formations. Earthquakes can be induced as part of the process to stimulate the production from tight ... associated with industrial activity, with a focus on the disposal of wastewater by injection in deep wells; assess the scientific understanding of induced...

Letter ID	Commenter Name	Commenter Org.	Text
			A Century of Induced Earthquakes in Oklahoma? (https://www.usgs.gov/news/century-induced-earthquakes-oklahoma) I related to oil production, particularly disposal of wastewater in deep injection wells, are known to potentially cause earthquakes. Prior to the ... Release Date: October 26, 2015The rate of earthquakes has increased sharply since 2009 in the central and eastern United States, with growing ... evidence confirming that these earthquakes are primarily caused by human activity, namely the injection of wastewater in deep disposal wells. The rate of ... earthquakes has increased sharply since 2009 in the central and eastern United States, with growing evidence confirming that these earthquakes are ... Sharp increase in central Oklahoma seismicity 2009-2014 induced by massive wastewater injection (https://pubs.er.usgs.gov/publication/70137863) data required to unequivocally link earthquakes to injection are rarely accessible. Here we use seismicity and hydro-geological models to show that ... earthquakes to distances of 35 km, with a triggering threshold of-0.07 MPa. Although thousands of disposal wells may operate aseismically, four of ... Sharp increase in central Oklahoma seismicity 2009-2014 induced by massive wastewater injection Science By: Kathleen, M. Keranen, Geoffrey A. Abers ... , Matthew Weingarten, Barbara A. Bekins, and Shem in Ge.
00448	Ex. 6 Personal Privacy (PP)	Individual	According to studies published on the USGS website, "An unprecedented increase in earthquakes in the U.S. mid-continent began in 2009. Many of these earthquakes have been documented as induced by wastewater injection." from Journal article 'High-rate injection is associated with the increase in U.S. midcontinent seismicity' Science By: Matthew Weingarten, Shemin Ge, Jonathan W. Godt, Barbara A. Bekins, and Justin L. Rubinstein. Source link: https://pubs.er.usgs.gov/publicationll0161978 Earthquakes have been know to cause springs to dry up. According to U.S. Geological Survey Fact Sheet 096-03 By Michelle Sneed, Devin L. Galloway and William L. Cunningham, "Hydrogeologic responses to earthquakes can create a variety of hazards. Water supply may be disrupted if wells go dry or become too turbid to pump, and infrastructure damage may result from ground motion." Source link: https://pubs.usgs.gov/fs/fs-096-03/
00462		Individual	This area is also seismically active, with known faults in close proximity. Given the known occurrences of induced seismicity from injection well operations, containment of hazardous materials cannot be guaranteed.
00470		Individual	Will there be seismic events with the pumping like there is with fracking?

Letter ID	Commenter Name	Commenter Org.	Text
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00479	Ken Hargens 11.3	Individual	Denver earthquakes 40 years ago were caused by Uncle Sam, not Mother Nature Article in Westword by Patricia Calhoun published Wednesday, August 24, 2011 at 6:54 a.m. Despite yesterday's earthquake that hit the Trinidad region, "Colorado is considered a region of minor earthquake activity," according to the U.S. Geological Survey. But forty years ago, a series of quakes rocked the Denver area -- quakes caused not by Mother Nature, but by Uncle Sam. How? The Army was dumping dangerous chemicals into a deep injection well out at the Rocky Mountain Arsenal. The Rocky Mountain Arsenal was created out of farmland on the eastern edge of metro Denver during World War II to arm the U.S. Army. After the war, it became a bustling center of industrial activity -- a top-secret center that created a lot of dangerous waste. Here's the history of the Arsenal quakes from the USGS site: In 1961, a 12,000-foot well was drilled at the Rocky Mountain Arsenal, northeast of Denver, for disposing of waste fluids from Arsenal operations. Injection was commenced March 1962, and an unusual series of earthquakes erupted in the area shortly after. It was 32 minutes after 4 a.m. on April 24 when the first shock of the Denver series was recorded at the Cecil H. Green Geophysical Observatory at Bergen Park, Colorado. Rated magnitude 1.5, it was not strong enough to be felt by area residents. By the end of December 1962, 190 earthquakes had occurred. Several were felt, but none caused damage until the window breaker that surprised Dupont and Irondale on the night of December 4. The shock shuffled furniture around in homes, and left electrical wall outlets hanging by their wires at Irondale. Over 1,300 earthquakes were recorded at Bergen Park between January 1963 and August 9, 1967. Three shocks in 1965 -- February 16, September 29, and November 20 -- caused intensity VI damage in Commerce City and environs. The Denver series was forgotten, however temporarily, in October 1966, when a southeast Colorado tremor rocked a 15,000 square-mile area of that State and bordering New Mexico. Minor damage, in the form of broken windows and dishes and cracked walls and plaster, occurred at Aguilar, Segundo, Trinchera, and Trinidad. Another strong shock rumbled through the Denver area on November 14, 1966, causing some damage at Commerce City and Eastlake. Slighter rumblings (below magnitude 3.0) occurred throughout the remainder of 1966, and through the first week of April 1967.

Letter ID	Commenter Name	Commenter Org.	Text
			Then, on April 10, the largest since the series began in 1962 occurred; 118 windowpanes were broken in buildings at the Rocky Mountain Arsenal, a crack in an asphalt parking lot was noted in the Derby area, and schools were dismissed in Boulder, where walls sustained cracks. Legislators quickly moved from beneath chandeliers in the Denver Capitol Building, fearing they might fall. The Colorado School of Mines rated this shock magnitude 5.0. Boulder sustained minor damage to walls and acoustical tile ceilings on April 27, 1967, as result of a magnitude 4.4 earthquake. Then a year and half after the Rocky Mountain Arsenal waste dumping practice stopped, the strongest and most widely felt shock in Denver's history struck that area on August 9, 1967, at 6:25 in the morning. The magnitude 5.3 tremor caused the most serious damage at Northglenn, where concrete pillar supports to a church roof were weakened, and 20 windows were broken. An acoustical ceiling and light fixtures fell at one school. Many homeowners reported wall, ceiling, floor, patio, sidewalk, and foundation cracks. Several reported basement floors separated from walls. Extremely loud, explosivelike earth noises were heard. Damage on a lesser scale occurred throughout the area. During November 1967, the Denver region was shaken by five moderate earthquakes. Two early morning shocks occurred November 14. They awakened many residents, but were not widely felt. A similar shock, magnitude 4.1, centered in the Denver area November 15. Residents were generally shaken, but no damage was sustained. A local shock awakened a few persons in Commerce City November 25. Houses creaked and objects rattled during this magnitude 2.1 earthquake. The second largest earthquake in the Denver series occurred on November 26, 1967. The magnitude 5.2 event caused widespread minor damage in the suburban areas of northeast Denver. Many residents reported it was the strongest earthquake they had ever experienced. It was felt at Laramie, Wyoming, to the northwest, east to Goodland, Kansas, and south to Pueblo, Colorado. At Commerce City merchandise fell in several supermarkets and walls cracked in larger buildings. Several persons scurried into the streets when buildings started shaking back and forth. During 1968, ten slight shocks were felt in Colorado. Only one, on July 15, caused minor damage at Commerce City. In September of that year, the Army began removing fluid from the Arsenal well at a very slow rate, in hope that earthquake activity would lessen. The program consisted of four tests between September 3 and October 26. Many slight shocks occurred near the well during this period. In its own account of the cleanup at the Rocky Mountain Arsenal, the Army web site offers this explanation:

Letter ID	Commenter Name	Commenter Org.	Text
			Deep well injection for liquid waste has been safely used for many years at sites throughout the United States without documented damage to human health or the environment. After an extensive study of deep injection wells across the country by the U.S. Environmental Protection Agency (EPA), it was concluded that this procedure is effective and protective of the environment. The Rocky Mountain Arsenal deep injection well was constructed in 1961, and was drilled to a depth of 12,045 feet: The well was cased and sealed to a depth of 11,975 feet. with the remaining 70 feet left as an open hole for the injection of Basin F liquids. For testing purposes, the well was injected with approximately 568,000 gallons of city water . prior to injecting any waste. However, when the Basin F liquids were actually introduced, the process required more time than anticipated to complete because of the impermeability of the rock. The end result was approximately 165 million gallons of Basin F liquid waste being injected into the well during the period from 1962 through 1966. The waste fluid chemistry is not known precisely. However, the Army estimates that the waste was a more dilute version of the Basin F liquid which is now being incinerated. Current Basin F liquid consists of very salty water that includes some metals, chlorides, wastewater and toxic organics. From 1962 --1963, the fluids were pumped from Basin F into the well. From 1964--1966, waste was removed from an isolated section of Basin F and was combined with waste from a pre-treatment plant, located near Basin F, and then pumped into the well. The waste from the pre-treatment plant was generally a solution containing 13,000 parts per million sodium chloride (salt). with a pH ranging from 3.5 to U,5. The organic content of the solution was high but is largely unknown. The injected fluids had very little potential for reaching the surface or useable groundwater supply since the injection point had 11,900 feet of rock ab~ s sealed at the opening. The Army discontinued use of the well in Feb. 1966 because of the possibility that the fluid injection was triggering earthquakes in the area. The well remained unused for nearly 20 years. In 1985, the Army permanently sealed the disposal well in stages. First, the well casing was tested to evaluate its integrity. Any detected voids behind the casing were cemented to prevent possible contamination of other formations. Next, the injection zone at the bottom 70 feet of the well was closed by plugging with cement. Additional cement barriers were placed inside the casing. across zones that could access water-bearing formations (aquifers). The final step was adding Bentonite, a heavy clay mud that later solidified, to close· the rest of the hole up to the ground surface. [Illegible.]

Letter ID	Commenter Name	Commenter Org.	Text
			If EPA has any influence, vote of all S.D's.
00481	Ex. 6 Personal Privacy (PP)	Individual	The Black Hills, in general, are also geologically unstable as there is already on going seismic activity. This is important as waste water deep injection wells have been linked to increased earthquake activity in Oklahoma
00493		Individual	Who is accountable when tectonic stability is changed and movement occurs that allows poison production water to further contaminate our regional groundwater?
00496		Individual	In its own outlines, the USGS lists specific factors necessary for injection wells to induce earthquakes. Those factors include the presence of faults that are large enough to produce eartquakes, stresses that are large enough to produce earthquakes, and the presence of pathways for the fluid pressure to travel from the injection point to faults. It is obvious that those same factors are in severe question in relation to this injection project.
00512		Individual	Injection wells like the one being proposed here have caused many problems in areas like Oklahoma over the last few years. The United States Geological Survey data shows that between 1978 and 2008 there were no more than 3 earthquakes per year with a magnitude of 3.0 or greater in Oklahoma. With the proliferation of fracking, the number of earthquake with a magnitude of 2.0 was 585, 887, and 639 for the years 2014-2016. The impact of these earthquakes is borne by citizens who suffer property damage and businesses who lose revenue while they recover.
00513		Individual	Injection wells have created increased earthquakes along fault lines. Is this a possibility in regards to the class V injection waste wells in the Dewey Burdock area?
00514		Individual	It has been discovered that pumping high pressure fluids into faults and cracks in the rock can and do cause increased earhquake activity and strength. The area in question is of this nature and has connection with immense cave networks such as Jewel and Wind Cave.
00527		Clean Water Alliance	The EPA also omits information in its discussion of seismic factors in the Class V Fact Sheet. It states that it is "not aware" of a seismic event causing an injection well to contaminate a USDW or of studies done to determine whether such contamination has occurred (p. 54). It then lists states that have been studied on this issue. The list omits states with injection wells that have been linked – at least in the media -- to seismic incidents, including Oklahoma, North Dakota, and Pennsylvania. The EPA may be "not aware" of some of the research, but it should be held to

Letter ID	Commenter Name	Commenter Org.	Text
	Ex. 6 Personal Privacy (PP)		a higher standard and required to do the relevant research before omitting important information. We also searched the Class V Fact Sheet looking for a thorough discussion of the seismic characteristics of the proposed mining and injection area. The presence of faults in the immediate area is mentioned (pp. 22-23), but their potential impacts are never analyzed. Similarly in the Class III Fact Sheet, the mechanisms by which Fall River formation water comes up through the Dewey fault is never analyzed (p. 45).
00555		Standing Rock Sioux Tribe	The potential pathway for migration of injectate into the Madison aquifer (per EPA) and then into surface water (per USGS) is improperly discounted by EPA. The agency has failed to give proper consideration of the potential existence of pathways resulting from unidentified faults or future seismic activity. The EPA finding that "the nearest potential pathway for fluid movement out of the injection zone in the Dewey area is the Dewey fault," is not supported by adequate data, in light of the regional seismology. (EPA, Dewey Burdock Class V Draft Area Permit Fact Sheet, p. 26).
07459 (Valentine hearing)		Individual	And something else, as for the water that can't be used later on that they want to inject in a lower area of the earth, that just reminds me of Oklahoma. That is fracking. That is high-pressure water going to lower levels that cause earthquakes.
07460 (5/8 Rapid City hearing)		Individual	If you look at the Madison in Edgemont, it's 4,000 feet deep, the water is boiling hot, 210 degrees -- boiling is 212 -- and it isn't pure either. It is exhibiting radioactivity and arsenic and other contaminants. If you look at the Madison in Provo, another 8 miles south, right near the depot there, you'll see a 4,200-foot well that has, you know, some level of radiation, some level of arsenic and it is boiling hot. The boiling hot tells you that this is a seismically active area. It's picking up the heat from the earth's crust, and it's coming up there. One of the things that we may see when we do all this is we may see earthquake activity. You know, I have experienced minor earthquakes at the ranch all my life, you know, things where the furniture moves a little bit, the pictures get cattywampus, this kind of thing. You can look out of the window of the ranch living room, and you can see an ancient volcano right straight out there, less than 5 miles away. This is a seismically active area to start with. That area just to the west has something called the Dewey Fault.

Letter ID	Commenter Name	Commenter Org.	Text
07461 (5/9 Rapid City hearing)	Ex. 6 Personal Privacy (PP)	Individual	Okay. So say if we can use these other chemicals to neutralize the radioactivity, what if -- okay, say, imagine if the radioactivity has no effect at all. We're still on fault lines. [...] So there's the water. There's also the fact that by causing vibration in the earth, we create an exponential butterfly effect. It happens with water, and it happens with earth. This is how tidal waves are created, and this is how earthquakes are created. This is how volcanoes begin to erupt. This how the earth might begin to shake.
07461 (5/9 Rapid City hearing)		Individual	This piece of paper that I brought with me is further indication that we don't know what goes on underneath the ground. And on page -- page 3, this is a document that was copied from the Geological Survey files. The Geological Survey wrote this document. On page 3 it says: "After an extensive study of deep injection wells across the country by the U.S. Environmental Protection Agency, it was concluded that this procedure is effective and protective of the environment." What they're talking about here is deep well injection wells. This particular document was initially downloaded in 2011. I don't know when it was printed or when the study was done. But anyway, it goes -- what happened is that Rocky Mountain Nuclear Arsenal -- Rocky Mountain Arsenal down by Denver, they decided to get rid of some of their nuclear waste. So they drilled a deep hole in the ground. They drilled this hole in 1961, and -- okay. They started -- they drilled the hole in 1961. They started injecting nuclear waste and liquid waste into this hole in March of 1961. The first earthquake happened down there on the 24th of April, 1961, very shortly after they started injecting in there. From 1963 to 1967 there was 1,300 earthquakes that were felt all the way from Laramie, Wyoming clear down to Trinidad, which is south of Pueblo. They stopped pumping nuclear waste and liquid waste into this borehole in March of 1966. The last quake was one of the most severe, and that was in August of 1967, and it registered 5.3. Okay. In 1985, several years after they quit pumping, they decided to plug the well, and they plugged it with bentonite and concrete. But all of this is indicative of the fact that I think this is a ridiculous proposal and it shouldn't happen in our state. I'm sure that if it was given to a vote of the people, the people wouldn't vote for this.
07461 (5/9 Rapid City hearing)		Individual	And I hope you guys are well-educated about geological -- of the plate tectonics. And the plate tectonics are always moving. So even with her plans about keeping it contained, it will never stay contained because by the plate tectonic theory, the earth is always moving.

Letter ID	Commenter Name	Commenter Org.	Text
			And the earth is always growing itself, and it will -- any earthquake can occur, and it will split anything. And you digging as far underground, you could speed up that process. And even contaminating water and overusage of the water and you pulling that water out of the land, then putting it back in can create carbons, and it will collapse. That's what you call a sinkhole. And that's a geological term. And I'm sorry to all the uncis here that I'm speaking English language, but it's what I grew up on. Thank you.
07462 (Hot Springs hearing)	Ex. 6 Personal Privacy (PP)	Individual	Ex. 6 Personal Privacy (PP) Oh, okay. Well -- so, in its own outlines, the United States -- two paragraphs. The United States Geological Survey lists specific factors necessary for injection wells to induce earthquakes. Those factors include the presence of faults that are large enough to produce earthquakes, stresses that are large enough to produce earthquakes, and the presence of pathways for the fluid pressure to travel. It is obvious that those same factors are in severe question in relation to this project. I think what I would like to say is that geology is an imperfect science. I'm sure the Powertech geologists would agree. What cannot be seen below ground cannot be anticipated or contained.
07642 (Hot Springs hearing)		Individual	Since no mining operations are occurring, no need is shown for disposal wells at this time. This area is also seismically active, with known faults in close proximity. Given the known occurrences of induced seismicity from injection well operations, containment of hazardous materials cannot be guaranteed.
07642 (Hot Springs hearing)		Individual	It has already been proved that injecting materials into high -- under high pressures deep underground causes earthquakes. This area is already having numerous earthquakes as the whole Black Hills is in uplift stage.
07642 (Hot Springs hearing)		Individual	The proposed permit in particular for deep injection wells that would be used to dispose of the ISR process waste fluids into the Minnelusa formation is a real threat to my family, home, and community for numerous reasons, including, one, the mining industry's recurrent inability to properly manage these materials safely; number two, the Black Hills's geology is not static, and the sheer movement of the earth allows for the material to flow into our aquifers; number three, uranium is known to cause harm to human health; and number four, the potential of increased seismic activity could result in our town losing its greatest resource, our water.

Letter ID	Commenter Name	Commenter Org.	Text
			In my letter here that I'll be submitting today, I have researched and noted specific scientific articles showing evidence to support each of the reasons I just listed, and that is why I'm asking you to deny these permits.
07642 (Hot Springs hearing)	Ex. 6 Personal Privacy (PP)	Individual	It has been discovered that pumping high-pressure fluids into faults and cracks in the rock can and do cause increased earthquake activity and strain.

12. Concerns about hydraulic fracturing.

Letter ID	Commenter Name	Commenter Org.	Text
00489	Ex. 6 Personal Privacy (PP)	Individual	Water is life – no fracking.
07443		Individual	Subject: No TO FRACKING FOR URANIUM OR ANYTHING ELSE!!! from Ex. 6 Personal Privacy (PP) Sir or Madam, **USGS FINALLY ADMITS THAT FRACKING CAUSES EARTHQUAKES** Ex. 6 Personal Privacy (PP) | Mar 2, 2017 | NO, I SAY A THOUSAND TIMES NO! NO FRACKING TYPE ACTIVITY! PERIOD! Underground Injection Control **USGS FINALLY ADMITS THAT FRACKING CAUSES EARTHQUAKES**
07460 (5/8 Rapid City hearing)		Individual	Ex. 6 Personal Privacy (PP) abini. . I am Dine from the Dine -- from the Navajo nation down in Arizona. My -- I come from the Yoo'o Dine'e Todich'ii'nii. I was born for Kinyaa'aanii. And I came here to speak on behalf of my people. A lot of us are lost in the fracking minings down that way from the coal mines and the uranium spillage that is spilling into our waterways that is now water waste. And so, pretty much, our water source is -- is just straight jacked.
07461 (5/9 Rapid City hearing)		Individual	The sulfuric acid, whenever you put hydrochloric acid into the ground to cause a fracture, and that's what causes it, along with radon and all these other things. That's what they use to make sure the fracture.